REMARKS

Claims 12-26 are pending and remain for consideration.

Claims 12-26 are rejected under 35 U.S.C. §102(e) as allegedly being anticipated by Popovic et al. (U.S. Pat. No. 4,829,352). The rejection is traversed and reconsideration is respectfully requested.

The present invention as recited in claim 12 is directed to a magnetic field sensor comprising a Hall element that has two inner and two outer contacts arranged along a straight line, wherein the two inner contacts are the same width, wherein the two outer contacts are the same width, wherein the contacts are arranged on a surface of a well of a first conductivity type that is embedded in a substrate of a second conductivity type, and wherein the two outer contacts are connected by a resistor.

Popovic discloses a Hall element comprising a plurality of interconnected portions formed in a common semiconductor layer. The Hall element shown in Fig. 6 has two portions (col. 5, lines 50-55). Each portion comprises its own n-well which is labelled with the reference number 2 or 3. The two n-wells 2 and 3 are electrically isolated from each other by the p-doped substrate 6 and the p-well 17. Each portion has four contacts located at the surface of the semiconductor material. The portion shown to the left has the contacts 7, one without reference number, 8 and 9, the portion shown to the right has the contacts 10, 11, one without reference number and 12. The surface contacts of the two portions are pairwise connected by metallic interconnection lines a2, c2, d2 and b2. Each portion further comprises four buried contacts constituted as a single common buried layer a1; b1; c1; d1 or a3; b3; c3; d3. With regard to the schematic Hall element shown in Fig. 1 that comprises four portions 1 to 4, Popovic points out that none of the portions 1 to 4, taken by itself, constitutes a complete Hall element (col. 4, lines 2-4). This holds also for the Hall element shown in Fig. 6 that is a practical realization of the schematic Hall element

shown in Fig. 3 which is a special case of the schematic Hall element shown in Fig. 1 with only the portions 2 and 3.

From this it follows that the structure of the Hall element of Popovic is completely different from the structure of the Hall element recited in claim 12. The Hall element of Popovic shown in Fig. 6 has 16 contacts, namely the contacts 7-12, two unlabeled contacts and the contacts a1; b1; c1; d1 and a3; b3; c3; d3 formed as two buried layers.

As is well-known in the art, the basic Hall element comprises four contacts, namely two current contacts for the supply of an electrical current to the Hall element and two voltage contacts for sensing the Hall voltage. The Hall element of Popovic also has four contacts which must not be confused with the 16 contacts of the individual portions. According to Fig. 3 the current contacts of the Hall element of Popovic are formed by the contacts a1, b1 and a3, b3, and the voltage contacts are formed by the contacts 9, 10 and 7, 12, respectively, which are connected by the metallic interconnection lines a2 and b2. The four contacts of the Hall element of Popovic are not arranged along a straight line and are not arranged on a surface of a well as is recited in claim 12. The two Hall contacts formed by the contacts 9, 10 and 7, 12 lie at the surface of the semiconductor material whereas the other two contacts a1; b1 and a3; b3 lie in a buried plane at a certain distance below the surface of the semiconductor material.

Comparing the structure of the Hall element of the present invention as recited in claim 12 with the structure of the Hall element of Popovic, the person of ordinary skill in the pertinent art finds out that the two outer contacts of the Hall element of the present invention correspond to the contacts (a1, b1) and (9, 10) of Popovic. The contacts (a1, b1) and (9, 10) are realised in completely different ways, one at the surface, the other in a buried layer, and it cannot be said that they are the same size. Furthermore, Popovic does not disclose connecting the contacts (a1, b1) and (9, 10) by a resistor as is recited in claim 12 of the present application.

For at least the reasons set forth above it cannot be maintained that Popovic discloses a Hall element having four contacts arranged along a straight line and a resistor connected to the outer contacts as is recited in claim 12. Having shown that the Hall element of Popovic and the Hall element of the present invention as recited in claim 12 are structurally different, it cannot be maintained that Popovic anticipates claim 12, and therefore the rejection of claim 12 under 35 U.S.C. § 102(e) should be withdrawn and claim 12 allowed.

Claims 13-23 each depend directly or indirectly from claim 12 and therefore incorporate the limitations of claim 12. Accordingly, these dependent claims are allowable for at least the same reasons set forth for claim 12.

Claims 24-26 all recite that the Hall elements have two inner and two outer contacts arranged along a straight line. As shown above, the Hall element of Popovic does not have its four Hall contacts arranged along a straight line, but has two contacts arranged at the surface and two contacts buried at a certain distance below the surface of the semiconductor material.

Popovic does not disclose placing all four Hall contacts in the same n-well and at the surface of the semiconductor material and placing an additional electrode between two contacts of the Hall element as is recited in claim 24. For at least these reasons it cannot be maintained that Popovic anticipates claim 24, and therefore the rejection of claim 24 under 35 U.S.C. § 102(e) should be withdrawn and claim 24 allowed.

Popovic does not disclose placing all four Hall contacts in the same n-well and having a doping of the well in an area between the two inner contacts different from a doping of the well in the areas between an inner contact and an outer contact as is recited in claim 25. Popovic places the Hall contacts in at least two n-wells electrically isolated from each other, and the doping of the n-wells are homogeneous. For at least these reasons it cannot be maintained that Popovic

anticipates claim 25, and therefore the rejection of claim 25 under 35 U.S.C. § 102(e) should be withdrawn and claim 25 allowed.

Popovic does not disclose a magnetic field sensor comprising a first Hall element and a second Hall element that each have two inner and two outer contacts arranged along a straight line as is recited in claim 26. Popovic only discloses one single Hall element. Therefore, Popovic cannot and does not disclose the other features of claim 26. For at least these reasons it cannot be maintained that Popovic anticipates claim 26, and therefore the rejection of claim 26 under 35 U.S.C. § 102(e) should be withdrawn and claim 26 allowed.

In view of the foregoing, it is respectfully submitted that claims 12-26 are in condition for allowance. All issues raised by the Examiner having been addressed, an early action to that effect is earnestly solicited.

No fees or deficiencies in fees are believed to be owed. However, authorization is hereby given to charge our Deposit Account No. 13-0235 in the event any such fees are owed.

Respectfully submitted,

By Daniel G Mackas
Daniel G. Mackas
Registration No. 38,541
Attorney for Applicants

McCORMICK, PAULDING & HUBER LLP
CityPlace II, 185 Asylum Street
Hartford, CT 06103-3402
(860) 549-5290